Africa or India, and it is improbable that they are represented in the Russian Permian. If this be so, pelycosaurs are unknown in any country where anomodonts (in the wider sense of that term) occur, so that the two groups may apparently be regarded as belonging to totally distinct faunas.

Dr. Case appears to have done his work very thoroughly, and the memoir is profusely illustrated. Before, however, expressing an opinion as to whether his restorations of cranial, and especially palatal, osteology are trustworthy, it would be essential to compare the original specimens with the figures. R. L.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

BY the will of Sir William G. Pearce, Bart., chairman of the Fairfield Shipbuilding and Engineering Co., Ltd., who died on November 2, Trinity College, Cambridge, will benefit to the extent of more than 400,000*l*. upon the death of Lady Pearce, should he have left no child.

THE joint matriculation board which directs and controls the matriculation examination of the universities of Leeds, Liverpool, Manchester, and Sheffield has issued its report for the year 1907. The number of candidates in July was 1,294, of whom 705 passed; and in September was 438, of whom 179 passed. The board has appointed a committee to draft a scheme for the inspection and examination of schools, and it has been assured by the universities of their general approval of the objects of the proposal.

A CONFERENCE of teachers, arranged by the London County Council, will be held at the Medical Examination Hall, Victoria Embankment, London, on January 2, 3, and 4. Two meetings will be held each day, and begin at 11 a.m. and 2 p.m. The subject for the first meeting will be nature-study, and addresses will be delivered by Dr. T. P. Nunn and Messrs. H. E. Turner and J. T. Winkworth. At the second meeting the teaching of botany will be discussed, and the speakers will include Miss Lulham, Miss Lilian Clarke, and Miss von Wyss. At the fifth meeting, manual work in the lower standards of elementary schools will be considered, and Dr. Slaughter and Messrs. J. C. Hudson and P. B. Ballard will speak. At the last meeting Mr. W. J. Hazlitt will read a paper on open-air geography. Applications for tickets of admission should be made to Dr. Kimmins, Education Department of the London County Council, Victoria Embankment, W.C.

THE annual meeting of public school science masters will be held at Westminster School on January 14, 1908. The meeting will commence at 10 a.m., when an exhibition of scientific apparatus will be opened. During the morning the president, Prof. H. A. Miers, F.R.S., will deliver an address upon the order in which science subjects should be taught (*a*) in public schools, (*b*) at the universities. In the morning also a discussion on teaching mechanics will be opened by papers on the educational value of mechanics by Mr. C. F. Mott, of Giggleswick School, and on the teaching of practical mathematics by Mr. H. Wilkinson, of Durham School. In the afternoon a discussion on teaching physics will take place, when papers will be read by Mr. C. Cumming, of Rugby School, on a scheme of laboratory work in physics; Mr. W. E. Cross, of Whitgift Grammar School, on a suitable curriculum for the first and second years; and Mr. J. M. Wadmore, of Oldenham School, on the compulsory teaching of elementary physics to junior forms.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, December 5.—"On the Distribution of the Different Arteries supplying the Human Brain." By Dr. C. E. **Beevor**. Communicated by Prof. David Ferrier, F.R.S.

The area of distribution of the different arteries of the brain was ascertained, when they were injected simultaneously under the same pressure with gelatin containing soluble colours, a method not used before.

The number of brains injected was eighty-seven. The arteries injected were the posterior communicating, the anterior choroid, the anterior cerebral, the middle cerebral, and the posterior cerebral.

The *method of investigation* consisted in injecting simultaneously by means of pressure bottles, three, four, or five of these arteries with different soluble colours. The injection mass used was gelatin, coloured with soluble carmine, Nicholson's blue, naphthol green, acridine yellow, and Bismarck brown. Twelve different classes of experiments were described. The brains were hardened in formalin, and subsequently cut and examined in the sagittal, horizontal, or coronal planes.

The parts of the brain, the arterial supply of which hitherto has not been described, or which was found to be different from that described by other observers, are:—

The regio subthalamica, with the corpus subthalamicum and Forel's field; the pes pedunculi; the corpus mammillare; the anterior limb of the internal capsule; the caudate and lenticular nuclei; the different nuclei of the optic thalamus (the thalamus is not supplied by the lenticulo-optic arteries of Duret); the anterior part of the choroid membrane, which is supplied by the anterior choroid artery; the fornix and the anterior commissure. The absence of anastomoses of the three arteries supplying the posterior limb of the internal capsule and of the two arteries to the head of the caudate nucleus was also noted.

In the cortex, the anterior cerebral area extends on the outer surface along the median line posteriorly, most frequently to mid-way between the Rolandic fissure and the external parieto-occipital fissure, and inferiorly to the sulcus frontalis superior. The middle cerebral area on the outer surface reaches the middle line for the posterior half of the parietal lobe, and posteriorly the posterior pole, or half an inch in front of it, and inferiorly the middle of the third temporal gyrus. The occipital fibres of the optic radiations in the superior lip of the calcarine fissure are usually supplied by the middle cerebral artery, and in the inferior lip by the posterior cerebral, except for about the posterior inch, which is supplied entirely by the posterior cerebral.

The knowledge of the exact part of the brain which is supplied by an artery is of great importance in the diagnosis of the parts of the brain which undergo softening when this particular artery is blocked by a blood clot.

"The Influence of Increased Barometric Pressure on Man. No. 4. The Relation of Age and Body Weight to Decompression Effects." By Leonard **Hill**, F.R.S., and M. **Greenwood**, jun.

Conclusions.—(1) Small mammals are relatively immune from decompression effects.

(2) This immunity depends on rapidity of circulation, and may be destroyed by damaging the latter with chloroform.

(3) Age is probably important *per se*, but of far less importance than body weight. We have no convincing proof that two animals of the same weight but different ages would exhibit unequal resisting powers.

(4) There is no evidence that small animals are more quickly poisoned by high pressures of oxygen than large ones.

The practical outcome of this research is that young men of small body weight and possessing a vigorous circulation should be selected for compressed air works.

Royal Meteorological Society, November 20.—Dr. H. R. Mill, president, in the chair.—Reports on the results obtained by the balloon observations made in the British Isles, July 22–27. The International Aëronautical Commission has for some years set apart the first Thursday in each month for the ascent of kites and balloons, but at last year's conference it was decided to make a special effort to obtain information on a series of consecutive days, and the last week in July was finally decided upon for the purpose. Twenty-five balloons with registering instruments were sent up in England and Scotland during the week, under the direction of Mr. W. H. Dines, at Pyrton

Hill, Oxon, and at Crinan, on the west coast of Scotland; Mr. J. E. Petavel, at Manchester University; Captain C. H. Ley, R.E., at Sellack, Herefordshire; and Mr. C. J. P. Cave, at Ditcham Park, Petersfield. Fourteen of the registering instruments have been found. Prof. W. E. Thrift also sent up a number of pilot balloons from Dublin. Nearly all the balloons drifted to the eastward, but several which reached a fair height fell within twenty miles of their starting point. The heights ranged up to more than $12\frac{1}{2}$ miles, the average being about $7\frac{1}{2}$ miles. The records showed that above $7\frac{1}{2}$ miles the temperature remained almost unaltered with change of height.—Discussion of the meteorological observations at the British kite stations, session 1906–7: Miss M. **White,** T. V. **Pring,** and J. E. **Petavel.** The authors found that the temperature gradient varies with the direction and the velocity of the wind, and also with the amount of clouds, being greatest for a north-west wind, and on clear and fine days. It appears that the direction of the wind alters at high levels, rotating in a clockwise direction; thus a south wind tends to become more westerly.

December 18.—Dr. H. R. Mill, president, in the chair.—The possibility of a topography of the air, based on balloon observations with special theodolites: Capt. C. H. **Ley.** The author gave the results of his own observations in Herefordshire in connection with the international balloon ascents which were carried out during the past summer. His method of observing is based on the direct estimation of the range of the balloon from its apparent diameter as measured by cross threads in a telescope; the range being thus determined, an altitude and azimuth are read, and the position if the balloon fixed and plotted on a map. The author, in conclusion, states that the varying topography of the earth's surface produces disturbances in the atmosphere with effects which are transmitted throughout the lower and middle strata; and that the general effect on a current is to increase its velocity over a hill and decrease it over a valley, and this is especially the case with the vertical velocity. The origin of the phenomena is to be sought in the mechanical effect of obstruction of the lowest stratum, but there are probably various ensuing complications which may accentuate the result. The measurement of these effects can be carried out by a topography of the air made in any locality.—Indications of approaching frost: R. **Strachan.** For the purpose of making forecasts, the dry and wet bulb thermometers should be noted at or after sunset, or at 9 p.m., and the amount of cloud at the time, and during the forepart of the night if convenient. The dew point can be found by reference to hygrometrical tables. When the dew point is at or below 32° frost is in evidence, but may be evanescent, due to a rise of temperature, with change of wind, rain, or overcast sky. Even when it is above 32°, if the sky is clear it is possible that the temperature on the ground will become low enough for frost to form. Thus the evening observations should lead to a good idea of what may happen during the night.

Royal Microscopical Society, November 20.—Lord Avebury, president, in the chair.—*Exhibits.*—Conrad **Beck**: Two specimens under microscopes of photographic plates prepared by the Lumière starch-grain process for colour photography. One specimen had been exposed and the other had not. The starch grains, which were about 1/2000-inch in diameter, were stained red, violet, and green. If the object-glass of the microscope showing the unexposed plate be racked out of focus, so that the colours be blended, a very close approximation to white light is obtained. If the objective be only partially out of focus, patches and channels of colour are visible, due to the fact that the coloured grains are not sufficiently intermingled. These patches are what were seen under the microscope exhibited; to see the individual grains a much higher power than the $\frac{1}{4}$-inch used would be required.—C. L. **Curties**: Two inexpensive microscopes. The first, termed the "nature-study" microscope, was mounted on a heavy square foot. It was non-inclinable, and for observing large objects the stage and mirror could be removed and the specimen placed on the flat base. The other instrument, named the "meat examiner's" microscope, is of similar design, but the stage has grooves on its upper surface, from front to back, of a pitch equal to the field of view of a 1-inch objective; a compressor having points projecting from its under side to fit into the grooves is supplied; by sliding the compressor in one groove and then in the next, until the whole length has been traversed, the entire specimen can be examined without going over the ground two or three times.—J. T. **Pigg**: Photomicrographic lantern-slides from nature, showing the various stages in the development of the fern spore from its germination to the mature frond with its fructification.—E. **Moffat**: A new form of filter for agar and other media.—*Papers.*—The François Watkins microscope: E. M. **Nelson.**—Mercury globules as test objects for the microscope: J. W. **Gordon.**—Light filters for photomicrography: E. **Moffat.**—Demonstration of the use of colour photography in metallurgy: E. F. **Law.** A number of photomicrographic lantern-slides were exhibited showing the brilliant colours produced on the polished surfaces of alloys by the varying degrees of oxidation caused by the heat-tinting process.

Physical Society, November 22.—Prof. J. Perry, F.R.S., president, in the chair.—Specimens of singing sand from New England: S. **Skinner.** The specimens shown were from two sea-beaches in New England, one at Manchester, Mass., and the other near Small Point, Maine. The beaches are alike in character in being surrounded by hard rock walls and in not having streams which might bring silt flowing through them. The sands are consequently very clean and free from small particles, and this especially so after each tidal washing. The sand consists chiefly of angular clear quartz fragments. Mr. Skinner has been able to verify most of the facts observed by Mr. Carus Wilson (NATURE, 1891), viz.:—(1) the sounds are best obtained by plunging a hard plunger into a glazed cup containing the sand; (2) after a time the production of the sounds becomes difficult; (3) the sounding may be restored by washing, which presumably removes fine powder formed by attrition between the particles; (4) it is necessary that the displacement of the sand by the plunger should occur easily. If there is resistance due to the shape of the vessel, or due to clogging by dust, the sounding is stopped. The theory put forward in "Sound" by Profs. Poynting and Thomson seems a reasonable explanation.—A micromanometer: L. **Bairstow.** The instrument exhibited was one of two which are in regular use at the National Physical Laboratory for measurements of pressures due to air currents. When the pressures on the two sides of the gauge are balanced, the whole of the liquids employed are in their zero positions, and errors due to capillarity and viscosity are avoided. The gauge exhibited has a sensitiveness of 1/10,000th of an inch of water and a range of three-fourths of an inch of water. The gauge is slightly sensitive to temperature due to the expansion of the castor-oil used, but the changes are small and easily allowed for by taking time readings of the zero. The gauge is not suitable for rapidly varying pressures, as considerable distortion of the oil surface leads to an irregularly displaced zero.—A diabolo experiment: C. V. **Boys.** The diabolo spool exhibited has the peculiar merit that no one can spin it. It is based upon the following principle. Either the ordinary spool of commerce, which has its moment of inertia about its axis of rotational symmetry a minimum, or a spool not generally made which has the corresponding moment of inertia a maximum, has stable rotation about this axis or about a transverse axis, *i.e.* if it is temporarily rotating about an axis inclined to one or other, it will tend to shift its momentary axis of rotation and gradually settle down so as to spin about one or other. If, however, the spool is so proportioned that the moment of inertia is identical about any axis, it has no tendency to spin stably about any particular axis, and the axis of rotation wanders about so rapidly that it cannot be spun. A heavy conical sheet projecting equally on either side of the vertex, the semi-vertical angle of which is equal to $\tan^{-1}\sqrt{2}$, has this property, but such an ideal construction is impracticable. All added matter beyond the sheet in the direction of the axis makes the momental ellipsoid more prolate, while any outside the sheet makes it more oblate. Treating, then, the ideal cone as a skeleton, and clothing it with matter within and without, a material double hollow cone may be made of the form of a diabolo spool, but with the dynamical properties of a sphere. It is preferable, however, to make the spool with an axial hole and with a slight preponderance of moment of inertia about its rotational axis. It will then spin perfectly. It may, however, be easily adjusted by the insertion of a stick, which is cut off of such a length as to make the moments of inertia equal, as tested by suspension from a torsion wire.—A gyroscope illustrating Brennan's mono-railway: Prof. H. A. **Wilson.** A gyroscope is mounted in bearings so that it can spin about a horizontal axis and precess freely. The gyroscope is further mounted at the top of a rectangular framework. The axis of spin of the wheel is first placed at right angles to the plane of the framework. Attached to the vertical axis about which the precessional motion occurs is a short crank with a spiral spring attached, so that when precession occurs in any direction the precessional couple is increased and the top returns towards its initial position. The oscillations of the gyroscope about its mean position become continually larger until the stability of the arrangement disappears.

Zoological Society, November 26—Mr. G. A. Boulenger, F.R.S., vice-president, in the chair.—Some new and little-known Araneidea: Rev. O. **Pickard-Cambridge.** Eleven species were noted or described and figured:—one from Lagos, Portugal; three from Cape Colony, South Africa; one from Mashonaland; five from the Canaries; and one from Old Calabar. Seven species were described as new to science. Five of the spiders had been accidentally imported to England in packages of bananas.—New species of beetles of the cryptocephaline division of the family Chrysomelidæ from tropical South America: M. **Jacoby.**—The correlation of certain modifications of the limpet-shell (*Patella vulgata*) with definite environmental conditions: E. S. **Russell.** The method adopted by the author had been to measure the dimensions of a large number of shells from one environment and to compare them with similar measurements of shells from a second environment. The author had found the limpet a suitable animal for such investigations, as all limpets above 15 mm. "home" accurately. Limpets from high-water localities were found to be larger, broader, and higher, but narrower in proportion than those from low-water localities. Limpets from exposed localities were lower, narrower, thicker, and more irregular in outline than those from sheltered spots. On the area from which the shells were collected two types occurred, a "rough" type with strong coarse ribs and irregular margin, associated with rough stones, and a "smooth" type on polished stones.—Anatomy of the batrachian family Pelobatidæ: F. E. **Beddard.**—The Microlepidoptera of Tenerife: Lord **Walsingham.**—Dates of publication of the separate parts of Gmelin's edition (thirteenth) of the "Systema Naturæ" of Linnæus: J. **Hopkinson.** The paper stated that the first volume of this edition, containing the animal kingdom, was in seven parts, with a date, 1788, in the first part only, but that there was internal evidence of a later date of issue of subsequent parts. Investigations in the library of the British Museum had revealed the years of publication with some indication also of the period of the year in which each part appeared. The dates were:—part i., 1788; parts ii. and iii., 1789; parts iv. and v., 1790; part vi., 1791; part vii., 1792. The second volume, containing the vegetable kingdom, was in two parts, and the date of issue of part ii. had been found to be 1792. Contemporary authorities were given for the dates.—A small collection of Mammalia brought from Liberia by Mr. Leonard Leighton: R. I. **Pocock.** The paper recorded the presence in Liberia of two mammals hitherto unknown from that locality, and contained descriptions of one species of Genet and one Linsang new to science.

December 10.—Sir Edmund G. Loder, Bt., vice-president, in the chair.—The origin of the mammal-like reptiles: Dr. R. **Broom.**—A revision of the African silurid fishes of the subfamily *Clariinae*: G. A. **Boulenger.**—A new species of hæmogregarine from the blood of a Himalayan lizard, *Agama tuberculata*, from Kasauli, India: Prof. E. A. **Minchin.**

Society of Chemical Industry, December 2.—Mr. R. J. Friswell in the chair.—The estimation of naphthalene in coal gas and spent oxide of iron: C. J. **Dickenson-Gair.** The methods of estimation described are (1) the acetic acid method; (2) the re-precipitation method.—Note on the influence of formal on the properties of *Funtumia elastica*: Dr. P. **Schidrowitz** and F. **Kaye.** The authors find that the rubber obtained from the latex, treated by formal, although less elastic and resilient than that obtained by other means, was extraordinarily tough. They suggest that a rubber of this character might be particularly suitable for some purposes—*e.g.* for the covers of motor tyres—where toughness is of relatively greater importance than resiliency, and that it may in the future be found desirable to use different methods of coagulation for the same latex according to the purpose for which the rubber is intended.—Polarimetric determination of sucrose: F. **Watts** and H. A. **Tempany.** The authors have investigated (1) the effect of basic lead acetate on the optical activity of sugar solutions; (2) the effect of clarification with basic lead acetate on cane juice.—Niam fat: Dr. J. **Lewkowitsch.** Niam fat was obtained from the seeds of *Lophira alata*, Banks, a tree indigenous to Senegambia, Sierra Leone, and the Egyptian Soudan. The fat, freed from extraneous matter, forms 41 per cent. of the kernels. It is a soft, buttery mass melting at 24° C., and is used by the natives for culinary purposes and as a hair oil.

Entomological Society, December 4.—Mr. C. O. Waterhouse, president, in the chair.—*Exhibits.*—Dr. G. C. **Hodgson**: A number of examples of *Anthrocera trifolii*, collected on the same ground in Sussex, and showing a wide range of variation, including three fine melanic forms, and several showing six spots on the upper-wings.—W. J. **Kaye**: A specimen of *Papilio thoas thoas*, with the central portions of both tails removed, apparently by a narrow-billed bird. The injury appeared so symmetrical that it was thought likely that the specimen was an abnormality, but microscopical examination showed that this was not so.—The **President**: Two photographs of an African locust, which had apparently caught a mouse and was preying upon it. The specimen was found in the Congo State.—R. S. **Bagnall**: Notes on many species of Coleoptera, Thysanoptera, and Aptera from Northumberland, Durham, and Scotland, of which ten were new to Britain.—L. W. **Newman**: A long and varied series of *Ennomos autumnaria* (*alniaria*); a series of *Polia xanthomista* (*nigrocincta*), bred from ova and fed on carrot, the specimens unusually large (N. Cornwall); three pairs of hybrid *Notodonta ziczac* ♂ × *N. dromedarius* ♀, = *N. newmani*, Tutt; three very fine *Xylina conformis* bred by Evan John, S. Wales; three cocoons (*in situ*) of *Dicranura bicuspis*, collected wild in Tilgate Forest; and a fine melanic ♂ *Oporabia dilutata*, taken wild in Bexley Woods, 1907, this being the first melanic specimen of the species reported from Kent.—Dr. F. A. **Dixey**: Male and female specimens of a new Belenois allied to *B. zochalia*, Boisd., but quite distinct from the *zochalia* group. These were captured by Mr. Wiggins in the Tiriki Hills, north-east of the Victoria Nyanza.—*Papers.*—(1) The natural enemies of *Bombyx rubi* in Scotland; (2) note in further illustration of the convergence of Limenitis (Basilarchia) in America: Prof. E. B. **Poulton.**—The rest attitude of *Hyria auroraria*: J. C. **Moulton.**—The family tree of moths and butterflies, traced in their organs of sense: A. H. **Swinton.**—Notes and descriptions of Pterophoridæ and Orneodidæ: E. **Meyrick.**—Studies on the Blattidæ: R. **Shelford.**—Notes on the bionomics of British East African butterflies: Rev. K. St. A. **Rogers.**

Geological Society, December 4.—Sir Archibald Geikie, K.C.B., Sec.R.S., president, in the chair.—The faunal succession in the Carboniferous Limestone (Upper Avonian) of the Midland area (north Derbyshire and north Staffordshire): T. F. **Sibly.** The area is the periclinal mass at the south end of the Pennine anticline. The series exposed constitutes an expanded development of the Dibunophyllum zone. The most extensive section shows a thickness of 1500 feet. Three subzonal divisions are distinguished:—D_3, subzone of *Cyathaxonia rushiana*; D_2, subzone of *Lonsdalia floriformis*; D_1, subzone of Dibunophyllum θ. An abnormal development of the Lonsdalia subzone forms a conspicuous local feature in parts of the western area. A local unconformity occurs in the eastern part of the area. A close similarity exists between the Dibunophyllum zone of the Midland area and that of North Wales. A comparison of the Dibunophyllum zone of the Midland with that of the S.W. province brings out important differences:—(*a*) the brachiopod fauna of the Lonsdalia subzone of the Midland province is richer than that of the equivalent part of the S.W. sequence; (*b*) the Cyathaxonia subzone of the Midland province is practically undeveloped in the S.W. province.—Brachiopod homœomorphy: *Spirifer glaber*: S. S. **Buckman.** The smooth, catagenetic stage of shells may have been attained by the loss of distinctive features, pointing to polygenetic origins. The series of shells figured by Davidson as *Spirifera glabra* do not all agree in being smooth. There is evidence that some forms ranged under this species are Reticulariæ (M'Coy). The use of the generic name Martinia for various smooth Spiriferids becomes unjustifiable. The author restricts the genus Spirifer, and allocates several British and foreign species among the genera Fusella, Choristites, Trigonotreta, Brachythyris, Martinia, and Reticularia.

Linnean Society, December 5.—Prof. W. A. Herdman, F.R.S., president, in the chair.—A series of specimens of *Spartina townsendi*, representing different stages of development and tall and dwarf forms, and for comparison also typical specimens of *S. alterniflora* and *S. stricta*: Dr. O. **Stapf.** The specimens of *S. townsendi* and *S. stricta* were collected by the exhibitor in the Isle of Wight; those of *S. alterniflora* near Millbrook Station in Southampton Water.—A collection of plants from Gunong Tahan, Pahang: H. N. **Ridley.**—Report on the Alcyonaria of the Sudanese Red Sea: Prof. J. A. **Thomson** and J. M. **McQueen.** The collection was made in 1906 by Mr. Cyril Crossland, from Suakim, Khor Dongola, and nine other localities, and includes three species of Stolonifera, eighteen of Alcyonacea, one being new, and four of Pseudaxonia.—Report on the Crinoidea of the Sudanese Red Sea: H. C. **Chadwick.** The collection consisted of six species, only two of which had been previously recorded from the Red Sea.—Notes on some marine algæ from the Red Sea: Prof. R. J. **Harvey-Gibson.** From material collected by Mr. Cyril Crossland in 1904 and 1905, under the direction of Prof. Herdman, F.R.S. The total number is thirty-five species; twelve belong to the Chlorophyceæ and as many to the Phæophyceæ, with eleven Rhodophyceæ. In an appendix the following phanerogams were mentioned as having been collected at the same time:—*Cymodocea nodosa*, Aschers., *Halophila stipulacea*, Aschers., *Najas major*, All., and fragments of *Salicornia fruticosa*, Linn.—Report on the Hydroida of the Sudanese Red Sea: Miss L. R. **Thornely.**

Mathematical Society, December 12.—Prof. W. Burnside, president, in the chair.—A formula in finite differences and its application to mechanical quadrature: S. T. **Shovelton.**—Weierstrass's E-function in the calculus of variations: A. E. H. **Love.**

Institution of Mining and Metallurgy, December 19.—Prof. William Gowland, president, in the chair.—The assay of telluride ores: G. T. **Holloway** and L. E. B. **Pearse.** The authors have, in view of the difficulty experienced by assayers in the determination of the precious metals in ores containing tellurium and selenium and the discrepancies observable between duplicate assays by different assayers, endeavoured to ascertain how and why, and in which portion of the assay work, the losses occur, and what means should be adopted to prevent them. The possible sources of loss appear to be as follows:—volatilisation during roasting; volatilisation and slag loss in the scorification assay; volatilisation and slag loss in the crucible assay; loss by volatilisation or in the slag in scorifying the lead button obtained in the scorification or crucible assay; or loss by volatilisation and absorption during cupellation. The paper contains details of a number of actual assays, and gives much valuable information in regard to the methods adopted and the results obtained.—A cheap form of cyanide plant: C. **Hunter.** A description of some cyanide plants of a light and portable nature actually supplied to small mining propositions in Rhodesia, with copies of the contracts and detailed specification. The cost of running such a plant is also stated.—The deep leads of Victoria, or the Cainozoic buried auriferous river deposits: H. L. **Wilkinson.** A review of the buried auriferous gravel deposits occupying the beds of ancient rivers once forming the drainage channels of Victoria at the period when large areas were covered by Pliocene seas. These include the Loddon, Avoca, Campaspe, Smythesdale-Pitfield, Stawell, and Ararat leads and their tributaries, and cover the districts of Ballarat and Bendigo. The author points out the effects of enriching belts in aggregating the rich portions of a lead and other factors determining the quantity of alluvial gold in the wash. At the end of the paper are several pages of tabular matter relating to the working costs of alluvial mines.

Cambridge.

Philosophical Society, November 11.—Dr. Hobson, president, in the chair.—A critical description of three cases of single hypogastric artery in the human fœtus: Dr. **Duckworth.**—The inheritance of white in poultry: R. C. **Punnett.**—Sexual phenomena in the free-living nematodes (preliminary note): F. A. **Potts.** The paper commenced by summarising the work of Maupas, and emphasised the interest and importance of the supplemental males found in the hermaphrodite species. These are chiefly remarkable for their withdrawal from the economy of the species, though in no sense degenerate, or unfitted for reproduction. Confirmation of Maupas's results was drawn from the study of a species of Diplogaster; some details of the culture methods used were given, and it was pointed out that this species shows that a race propagating exclusively by self-fertilisation does not of necessity show signs of degeneracy.

November 25.—Dr. Hobson, president, in the chair.—The orientation of 3:5-dichloropyridine: Dr. **Sell.**—The action of metallic magnesium on certain aliphatic acids, and the detection of formic acid: Dr. **Fenton** and H. A. **Sisson.** In a previous communication (Trans. Chem. Soc., 1907, 687) it was shown that both carbonic and formic acids may be reduced by means of metallic magnesium to formaldehyde. Experiments have now been undertaken with the object of ascertaining whether an analogous reduction can be effected in other acids, and the results so far obtained appear to indicate that this is only possible in the lower members of a series. Further, it is shown that this reduction by means of magnesium affords a characteristic and fairly delicate test for formic acid, the special reactions for formaldehyde being of a far more positive character than those for formic acid.—Some colour-reactions of organic acids with phenols: Dr. **Fenton** and G. **Barr.** Remarkably brilliant colour-reactions are often obtained when certain organic acids are treated with phenolic compounds in presence of strong sulphuric acid, and it appeared desirable to tabulate the results obtained with some of the less common acids in order to ascertain whether the reactions might be employed for the purpose of preliminary identification. By comparing the colours obtained in this way with two or more phenols, information of a positive character may often be obtained. The method has the advantage of being applicable, not only to the acids themselves, but also to their salts or esters, and is useful for provisional identification when only minute quantities of the substance are available.—Contributions to the knowledge of the oxaloimidochlorides: S. **Ruhemann.**—The absorption spectra of collidine and 9-chlorcollidine: J. E. **Purvis** and W. H. **Foster.** The curve obtained from a study of collidine showed that it was very similar to that of pyridine and lutidine previously studied by Hartley and by Baker and Baly. The differences were that there was a slight shift of the band towards the red end of the spectrum, and also that the persistence of the band was decreased a little less than that of lutidine and pyridine.—The decomposition and nitrification of sewage (1) in alkaline solution, (2) in distilled water: J. E. **Purvis** and R. M. **Courtauld.** The results showed that after incubations extending over eight weeks there were only small quantities of nitrates produced; also that (1) there were smaller quantities of nitrates produced in the alkaline solution than in the non-alkaline; (2) a larger comparative increase of the free ammonia in the alkaline than in the non-alkaline solution; and (3) a progressive diminution in the total ammonias.—The influence of light and of copper on fermentation: J. E. **Purvis** and W. A. R. **Wilks.** The results showed that fermentation under sterilised and non-sterilised conditions in glass vessels under the influence of various spectral colours, as well as of white light, was not very seriously influenced. The most marked effects were in differences in the acidities of the fermented wort; the fermentations under the influence of red rays were more acid than those in the white light, but the differences in the numbers obtained from the optical activities were not sufficiently marked to draw definite conclusions. The influence of copper on the fermentation was very marked. Very small quantities were sufficient to cause great differences in the numbers obtained from the optical activity, the copper oxide reducing power, the attenuation, and the acidity.—Resolution of optically active ammonium salts by means of tartaric acid: H. O. **Jones.**—Studies on platinocyanides: L. A. **Levy.** The crystals of barium platinocyanide may be obtained in two forms, which exhibit a great difference in physical properties—notably in their fluorescence and colour. The present communication contains an account of the author's experiments on the nature of the two varieties and the fluorescence exhibited by them.—Orientation of substituted brom-anilines: J. R. **Hill.**—The solutions of ordinary linear differential equations having doubly periodic coefficients: J. **Mercer.**

Dublin.

Royal Dublin Society, November 19.—Prof. Sydney Young, F.R.S., in the chair.—The synthesis of glycosides: some derivatives of xylose: H. **Ryan** and G. **Ebrill.** By the action of acetyl chloride on xylose in a sealed tube acetyl-chloro-xylose was obtained. The substance, which crystallised well, melted at 101° C. From it the xylosides of α-naphthol and carvacrol, and the tetracetyl derivative of xylose were prepared. βα-Naphthyl-xyloside was formed by addition of acetyl-chloro-xylose to a solution of potash and α-naphthol in absolute alcohol. It crystallises in long needles, which melt at 192° C. to 193° C. The substance is soluble in alcohol, acetone, and acetic ester, and almost insoluble in ether, carbon bisulphide, chloroform, and petroleum ether. It does not reduce Fehling's solution. Emulsin has no action on it. In a similar manner acetyl-chloro-xylose was converted into carvacryl-xyloside. The latter substance crystallises in needles, which are soluble in alcohol, ether, chloroform, acetic ester, and acetone, but are insoluble in carbon bisulphide. Its melting point is 105° C. Like the corresponding α-naphthyl compound, it reduces Fehling's solution only after inversion by hot dilute acids. Tetracetyl-xylose, which was obtained by the action of silver acetate on acetyl-chloro-xylose, is a crystalline solid which melts at 119° C. (uncorr.).—The radio-activity of sea-water: J. **Joly.** Examination of five samples of sea-water from various points round the Irish coast seems to show that when care is taken not to precipitate the radium in a non-emanating form when concentrating by evaporation (and for this purpose it is necessary to add a few c.c. of pure HCl when evaporating), the quantity of radium found is much greater than has been ascribed to sea-water hitherto. The larger values found may be in part due to suspended coastal materials. Experiments on mid-ocean waters are in progress.

Manchester.

Literary and Philosophical Society, October 29.—Prof. H. B. Dixon, F.R.S., president, in the chair.—The atomic weight of radium: Dr. H. **Wilde.**—The production and origin of radium: Prof. E. **Rutherford.** An account was given of the historical development of our ideas in regard to radium. On the disintegration theory, radium is regarded as a substance undergoing slow spontaneous transformation with a period of about 2000 years. In order to account for the existence of radium in minerals of great age, it is necessary to suppose that radium is produced from another substance of long period of transformation. There is a genetic connection between uranium and radium, for investigation has shown that the amount of radium in minerals is in all cases proportional to their content of uranium. If this be the case, radium should gradually appear in a preparation of uranium, initially freed from radium. No such growth of radium has been observed over a period of several years, although a very minute growth of radium can be easily detected. This is not necessarily inconsistent with the disintegration theory, for if one or more products of slow transformation exist between uranium and radium, no appreciable growth of the latter is to be expected in a short interval. A search for this intermediate product has recently proved successful. Boltwood found that a preparation of actinium, initially freed from radium, grew radium at a constant and rapid rate. Boltwood at first considered that actinium was this intermediate product, and that actinium changed directly into radium. The growth of radium in actinium solutions was confirmed by the author, who had commenced experiments in that direction three years before. The experiments showed, however, that actinium did not, as Boltwood supposed, change directly into radium. By a special method, a preparation of actinium was obtained by the author which showed no appreciable growth of radium over a period of 240 days. The growth of radium, if it occurred at all, was certainly less than 1/500th of that ordinarily observed. In another case, a solution of actinium was obtained which produced radium faster than the normal. These results are completely explained by supposing that a new substance of slow transformation is present with actinium, and this substance is transformed directly into radium. This parent of radium has distinct chemical properties, which allow it to be separated from both actinium and radium. The absence of growth of radium observed in the actinium solution mentioned above is due to the fact that, by the special method, the parent of radium had been completely separated from the actinium. In recent letters to Nature, Boltwood confirmed the results of the author, and described a satisfactory method of separating the radium parent from actinium. He has shown that this new body, which he proposes to call "ionium," gives out α and β rays, and has the chemical properties of thorium. The Royal Society recently loaned the author the actinium residues from about a ton of pitchblende. These residues contain the parent of radium, and experiments are in progress to isolate and concentrate both the actinium and ionium in these residues.

November 12.—Prof. H. B. Dixon, F.R.S., president, in the chair.—(1) The cone of *Bothrodendron mundum* (Will.); (2) on the ulodendroid scar: D. M. S. **Watson.** In the former it was pointed out that the small hermaphrodite lycopodiaceous cone described by Williamson in part x. of his series of monographs on the organisation of the fossil plants of the Coal-measures had an axis which agreed very closely with the wood of a small stem of *Bothrodendron mundum.* On the evidence of the characters of the axis and of the sporophylls, supported by constant association of the cone or its characteristic megaspores with stems of *Bothrodendron mundum*, it was concluded that the cone in question was really that of *Bothrodendron mundum.* In the paper on the ulodendroid scar, the theory that ulodendroid scars were produced by the pressure of the bases of sessile cones was shown to present difficulties, *e.g.* cones large enough to have produced scars 6 inches in diameter were unknown, and it was difficult to see how the scars would have grown appreciably without becoming wider laterally than vertically, which was never the case. It was shown that all the ordinary features of a ulodendroid scar could be explained on the theory that it represented the base of a branch attached to the whole area of the scar.

New South Wales.

Linnean Society, September 25.—Mr. J. H. Maiden, vice-president, in the chair.—The genus Petalura, with description of a new species (Neuroptera: Odonata): R. J. **Tillyard.** This remarkable isolated genus is probably a relic of an ancient Australian odonate fauna, which is now being steadily displaced by an Asiatic invasion. *P. gigantea*, Leach, occurs round Sydney and on the Blue Mountains, and was described nearly a hundred years ago. It is about $4\frac{1}{2}$ inches across the wings. The new species, *P. ingentissima*, is found in northern Queensland. It is the largest dragon-fly known to exist at present (about 6 inches across the wings), and seems to show connection with the huge Tertiary Gomphinæ which have been found in a fossil state. It is exceedingly rare, and becoming obsolete; the only two specimens known are the types.—The dragon-flies of south-western Australia: R. J. **Tillyard.** The district worked was that lying between Perth on the north and Cape Leeuwin on the south, which has a regular and abundant rainfall. It may be divided into two portions, the Darling Ranges with their running streams, and the low coastal strip with lagoons and marshes. The Odonata of the two portions were found to be very distinct. Twenty-six species were noted, of which six are new and very interesting forms (referable to the genera Synthemis [2], Austrogomphus, Austroæschna, Argiolestes, and Pseudagrion); four or five others are very rare, and the rest are common eastern species. Many of the species are black or nearly so, and seek protection on the burnt stumps or in the foliage of the "black-boys" (Xanthorrhœa), which are abundant everywhere.—Note on a glaucophane schist from the Conandale Range, Queensland: H. I. **Jensen.**—Chemical note on recent lava from Savaii: H. I. **Jensen.**—Revision of Australian Lepidoptera, part iv.: Dr. A. J. **Turner.** This paper continues the revision of the family Geometridæ, and is mainly concerned with the subfamily Sterrhinæ. When Mr. Meyrick revised this group in 1887, he recognised thirty-two species, referred to five genera; the present revision treats of one hundred and two species, ascribed to twenty genera. Five species, referable to the subfamily Hydriomeninæ (dealt with in the preceding paper), are also described as new.

October 30.—Mr. A. H. Lucas, president, in the chair.—The Tertiary limestones and foraminiferal tuffs of Malekula, New Hebrides: F. **Chapman.** These rocks form part of the collection made by Mr. D. Mawson in 1903. The paper deals with the Miocene and the post-Miocene rocks of Malekula, south of Santo. Trillina has been found to occur in the New Hebrides; this genus has already been proved to exist in South Australia and the Philippines, which thereby connects the south coast of Australia with the islands of east Australasia and portions of the East Indian Archipelago, along which line in Oligocene times there probably existed a shallow-water area where such forms could flourish. A new species of Alveolina found in the Malekula limestone had already been figured from Javan Miocene limestones. *Lepidocyclina angularis*, found at Malekula, and already known from Miocene limestone in the Loo-Choo Islands, off Japan, shows a further extension of the Miocene shore-line as far north as Japan.—A collection of dragon-flies from Central Australia, with descriptions of new species: R. J. **Tillyard.** The collection was made by Mr. J. F. Field, and is probably typical of the odonate fauna of Central Australia. Though well within the tropics, yet the locality exhibits no definite tropical forms. The 320 specimens examined comprise ten species; eight are common over Australia, two are new. One, *Lestes aridus*, is allied to *L. leda* and *L. analis*; the other, *Austrosticta Fieldi*, is the type of a new genus.—Memoir on a few heteropterous Hemiptera from eastern Australia: G. W. **Kirkaldy.** This memoir records the Heteroptera collected by Mr. A. Koebele and Dr. R. C. L. Perkins in Queensland, and by Mr. Koebele in New South Wales. Seven genera and twenty-five species are proposed as new.—The geographical significance of floods, with especial reference to glacial action: E. C. **Andrews.** The forms of roadside gutters and of miniature cañons admit of explanation, since the time occupied in their formation falls within decades. Storm-formed cañons show, in the initial stages, spurless trenches **U**-shaped in cross-section, the trench bases possessing deep basins. At a later stage these cañons show double slopes, the upper **V**-shaped, the base **U**-shaped, in cross-section. This lower contour represents the *flood* contour. In river valleys, along shore-lines, and in glacial cañons, forms similar to these occur. Along miniature cañons generally the flood alone does the corrosive work. The application of such truths to glacial cañons explains drumlin forms and other apparent anomalies.—Solandrine, a new midriatic alkaloid: Dr. J. M. **Petrie.** The alkaloid belongs to the atropine group, and resembles hyoscine. It differs from hyoscine in its aurochloride in not reddening phenolphthalein, and it yields atropic instead of tropic acid when hydrolysed. Though the exact constitution of the alkaloid has not been worked out, the results afford evidence of the existence of a tropeine alkaloid in *Solandra laevis*, for which the name solandrine is proposed.—Description d'une nouvelle Espèce d'Oxylæmus (Coleoptera: Colydiidæ): A. **Grouvelle.**

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